Quarterly Status, Management, and Cost Report #9

Contract Name:	Seismic Calibration for IMS Stations in North Africa and Western Asia (Group 2)
Contractor:	Science Applications International Corporation
Contract Number:	DTRA01-00-C-0013
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Period of Performance:	March 1, 2000 – February 28, 2003
Reporting Period:	March 30, 2001 – June 21, 2001

Background

The Group 2 Consortium is composed of SAIC as the prime contractor with Harvard University, University of Colorado at Boulder (CUB), University of California San Diego (UCSD), Geophysical Institute of Israel (GII), Multimax, and Western Services as subcontractors.

Travel-time corrections will be developed, tested, and validated in two phases over a period of three years. The team will construct location corrections, as recommended by CTBT/WGB/TL-2/18, using three methodologies: 1) Tectonic regionalization will be used to assign 1D velocity models to each tectonic province and SSSCs computed by 2D and 3D ray-tracing. 2) 3D hybrid models consisting of global and regional models will be constructed and ray-tracing will be performed. 3D hybrid models will make use of the best available models for each region. Team members as part of related work may perform revision of 3D models using available data in selected regions. 3) Event clusters will be selected and Joint Hypocenter Determination (JHD) will be used to define empirical travel time corrections for small selected regions. Inter-comparison of methodologies will contribute to a priori modeling error estimates. Offline unit testing and validation of model-based SSSCs will be performed using existing and expanded Ground Truth (GT).

Progress in Current Reporting Period
(March 30, 2001 – June 21, 2002)

Administrative

- A draft "Phase 2 Delivery and Test Plan" was delivered to the CMR RDSS for discussion.

Meetings/papers/memos

- April 17-19. Several consortium members attended the SSA Annual Meeting. Abstracts and papers are posted to the Consortium web page, (http://g2calibration.cmr.gov/calibration/refer.html).

  Bhattacharyya, J., McLaughlin, K., Yang, X., Antolik, M. and Ekstrom, G., Using Teleseismic Travel Time Calibrations Based on a 3D Earth Model to improve Seismic Event Location, SSA 2002 Annual Meeting, Victoria, British Columbia, Canada, 17-19 April 2002.

  Bondar, I., Mclaughlin, K., Yang, X., and Bhattacharyya, J., Assessing Location Improvements without Ground Truth Data, SSA 2002 Annual Meeting, Victoria, British Columbia, Canada, 17-19 April 2002.

  Mclaughlin, K., Yang, X., Bondar, I, Bhattacharyya, J., Israelsson, H., Kirichenko, V., Kraev, Y., Engdahl, E. R., Ritzwoller, M., Levshin, A., Shapiro, N., Barmin, M., Antolik, M., Dziewonski, A., Ekstrom, G., Gupta, I., Wagner, R., Hofstetter, A., Shapira, A., And Laske, M.G., Improved Seismic Event Location In Europe, Middle East, North Africa, And Western Asia Using 3d Model-Based Regional Travel Times, SSA 2002 Annual Meeting, Victoria, British Columbia, Canada, 17-19 April 2002.

- April 22-26. Several consortium members attended the Oslo location Workshop. Abstracts and presentations are posted on the Consortium web page, (http://g2calibration.cmr.gov/calibration/refer.html).

  Collection, Validation and Utilization of Reference Events, Dr. E. R. Engdahl, Dr. Eric A. Bergman, Dr. Michael Ritzwoller, Dr. Anatoli Levshin, Dr. Nikolai Shapiro.

  Status of Reference Event Collection for Western Eurasia, the Middle East, Northern Africa, and Europe - The Group 2 Location Calibration Consortium Reference Event List 2.0 Delivery. Bondár , I., E.R. Engdahl , H. Israelsson1, X. Yang1, A. Hofstetter , H.A. Ghalib , I. Gupta4, R. Wagner, V. Kirichenko and K. McLaughlin.

  Development of a Global 3D Upper Mantle Velocity Model for Regional Pn and Sn Calibration in Western Eurasia, the Middle East, Northern Africa, and Europe - The Group 2 Location Calibration Consortium Phase 1 Model Delivery J. Bhattacharyya, N. Shapiro, H. Israelsson, M. Ritzwoller and M. Barmin.

Testing and Validation of the Group 2 Location Calibration Consortium Regional Pn and Sn Calibration Phase 1 Delivery in Western Eurasia, the Middle East, Northern Africa, and Europe Xiaoping Yang, Keith McLaughlin, István Bondár, Joydeep Bhattacharyya, Hans Israelsson.

Merging Teleseismic & Regional Model-Based Location Calibration in Western Eurasia, the Middle East, Northern Africa, and Europe using 3D Global Earth Models J. Bhattacharyya, M. Antolik, X. Yang and I. Bondár.

Kirichenko, V.V. and Y. Kraev, Results of 1-D location calibration studies related to the territory of Northern Eurasia, 23rd CTBT Seismic Research Symposium, Jackson Hole, WY, October 1-5, 2001.

- The abstract for the 2002 SRS mtg was submitted and is posted at the Consortium web site.

  McLaughlin, K., I. Bondár, X. Yang, J. Bhattacharyya, H. Israelsson, R. North, V. Kirichenko, E.R. Engdahl, M. Ritzwoller, A. Levshin, N. Shapiro, M. Antolik, A. Dziewonski, G. Ekström, H. Ghalib, I. Gupta, R. Wagner, W. Chan, W. Rivers, A. Hofstetter, A. Shapira, and G. Laske, Seismic Location Calibration in the Mediterranean, North Africa, Middle East and Western Eurasia, 24th Seismic Research Review, Ponte Vedra Beach, FL, September 17-19, 2002.

Data development

Reference Event List 2.X. Reference events (GT0-10) and seismic event bulletins continue to be collected and merged in the Consortium's region of interest (15S-80N, 40W-100E):

- Consortium web pages were updated to present Reference Event List 2.0 metadata and provide an interactive search mechanism for origins by date & location (http://g2calibration.cmr.gov/calibration/refsel.html) (SAIC).
- A cluster database has been created with cluster centroids and empirical path corrections from 62 HDC and JHD clusters (CUB & SAIC).
- Potential clusters are under consideration in Djibouti, Kenya, Kuwait, & Cyprus (Multimax & SAIC).

Model/SSSC development:

During this reporting period the consortium continued to focus on Phase 2 model and SSSC development. During Phase 2, CUB will provide a revised 3D crust & upper mantle model (CUB2.0), CUB will continue to collect reference event data and validate GTX events with HDC cluster analysis, Harvard & SAIC will pursue the use of teleseismic P-wave SSSCs in the Group 2 region, Multimax continues to collect and analyze reference events, GII continues to collect reference event data and investigate regional Pg and Lg in the middle east, UCSD is evaluating crustal models for the region, Western Services will collect reference event data in central Asia, SAIC will continue to coordinate activities, maintain the reference event database, investigate model errors, and integration results. Some highlights of the reporting period are listed below.

- The Harvard teleseismic raytracer and the associated global model, SP12, was installed at SAIC. Ancillary software to convert travel times to teleseismic SSSCs was developed and installed at SAIC. Teleseismic SSSCs for about 1,500 stations for P and S phases were computed.
- Harvard delivered a new model, SP362, and a new raytracer for teleseismic P/S-wave SSSCs to the consortium. SAIC has begun integration (SSSC tcomputation) and testing.
- Claudia Piromallo of Istituto Nazionale di Geofisica e Vulcanologia (INGV) provided their Mediterranean region model, PM0.5. SAIC began limited tests of the Istituto Nazionale di Geofisica e Vulcanologia (INGV) 3D velocity model.
- UCSD provided "An Evaluation of the SAIC Regionalized Model (Part 1: Sediment and Crustal Thiscknesses) by Laske and Tkalcic. A review of regionalized crustal models for use in possible Pg & Lg SSSC computations.

Plans for Next Reporting Period
(June 22, 2002 – September 13, 2002)

Administrative

- NA

Papers/reports/memos

- The 2002 SRS meeting paper will be submitted.

Data development

- Reference event collection and validation will continue. Emphasis will be placed on consolidating the Reference Event List 2.X for relocation testing and validation in the Fall of 2002.
- Access to the "Reference Event Cluster Database" will be provided on the Consortium web page.

Model development

- CUB will deliver CUB2.0 to the consortium. SAIC will begin integration (SSSC computation) & testing.

Cost Report

See attachments.